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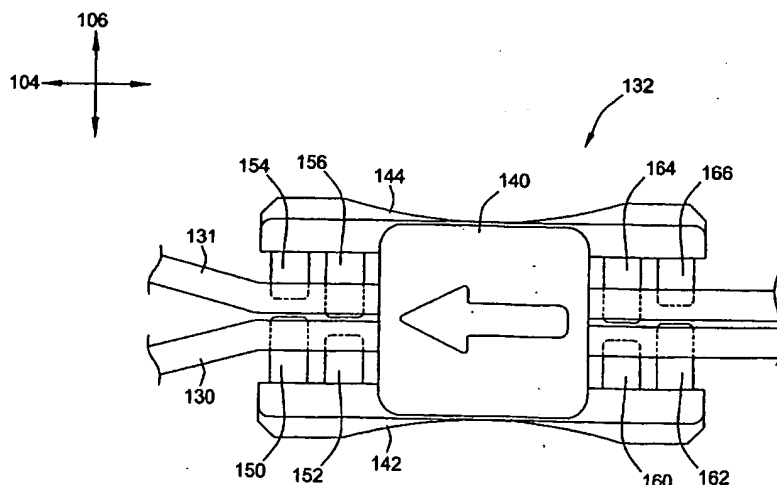
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(54) Title: **CLOSURE DEVICE**



(57) Abstract: A container (120) includes a closure device (121). The closure device includes interlocking fastening strips (130, 131) and a slider (132) slidably disposed on the fastening strips for facilitating the occlusion and deoccluding of the fastening strips. The slider (132) includes a top portion (140) and first and second side portions (142, 144). The slider additionally includes shoulders that merge into the first and second side portions and prevent the slider from being disengaged from the fastening strips. The slider includes long length front shoulders (150, 156) and long length rear shoulders (162, 164) in conjunction with shorter length rear shoulders (160, 166). If an upward force (180) is applied to the slider (132), the longer length shoulders are designed to remain engaged with the fastening strips when the side portions of the slider are forced to flex outward.

CLOSURE DEVICEFIELD OF THE INVENTION

5 The present invention relates generally to closure devices and, more particularly, to a slider having shoulders of differing lengths. The invention is particularly well suited for fastening flexible storage
10 containers, including plastic bags.

BACKGROUND OF THE INVENTION

The use of closure devices for fastening storage
15 containers, including plastic bags, is generally known. Furthermore, the manufacture of closure devices made of plastic materials is generally known to those skilled in the art, as demonstrated by the numerous patents in this area.

20 A particularly well-known use for closure devices is in connection with flexible storage containers, such as plastic bags. In some instances, the closure device and the associated container are formed from thermoplastic
25 materials, and the closure device and the sidewalls of the container are integrally formed by extrusion as a single piece. Alternatively, the closure device and sidewalls of the container may be formed as separate pieces and then
30 connected by heat sealing or any other suitable connecting process. In either event, such closure devices are particularly useful in providing a closure means for retaining matter within the bag.

Conventional closure devices typically utilize mating
35 fastening strips or closure elements, which are used to

selectively seal the bag. A slider may be provided for use in opening and closing the fastening strips. Some of these sliders include a separator. When the slider is moved in the appropriate direction, the separator divides
5 the fastening strips and opens the bag.

The slider may include shoulders disposed along the bottom of the slider that engage the fastening strips and prevent the slider from being removed from the fastening
10 strips. However, if enough force is applied to the slider in the vertical direction, the sides of the slider may flex outwards allowing the slider to be removed from the fastening strips.

15 SUMMARY OF THE INVENTION

According to the teachings of the present invention, the closure device includes interlocking fastening strips. The closure also includes a slider slidably disposed on the interlocking fastening strips for facilitating the
20 occlusion and deocclusion of the fastening strips when moved towards first and second ends of the fastening strips. The slider includes a shoulder with a short length and a shoulder with a long length. The short and long length shoulders are disposed across from each other
25 along the bottom edge of the slider. The longer shoulders are designed to remain engaged to the fastening strips if sufficient force has been applied to the slider to flex the sides of the slider.

30 These and other objects, features, and advantages of the present invention will become more readily apparent upon reading the following detailed description of exemplified embodiments and upon reference to the accompanying drawings herein.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a container according to the present invention in the form of a plastic bag;

5 Fig. 2 is a fragmentary top view of the container in Fig. 1;

Fig. 3 is a top view of an embodiment of a slider;

10 Fig. 4 is a front view of the slider in Fig. 3;

Fig. 5 is a right side view of the slider in Fig. 3;

15 Fig. 6 is a left side view of the slider in Fig. 3;

Fig. 7 is a rear view of the slider above the fastening strips;

20 Fig. 8 is a rear view of the slider partially on the fastening strips;

Fig. 9 is a rear view of the slider attached to the fastening strips;

25 Fig. 10 is a top view of another embodiment of a slider;

Fig. 11 is a rear view of the fastening strips;

30 Fig. 12 is a rear view of another embodiment of fastening strips;

Fig. 13 is a rear view of another embodiment; and

35 Fig. 14 is a rear view of another embodiment.

While the present invention will be described and disclosed in connection with certain embodiments and procedures, the intent is not to limit the present invention to these embodiments and procedures.

DESCRIPTION OF THE EMBODIMENTS

Fig. 1 illustrates an embodiment of a container in the form of a plastic bag 120 having a sealable closure device 121. The bag 120 includes a first sidewall 122 and a second sidewall 123 joined at seams 125, 126 to define a compartment accessible through the open top end but sealable by means of the closure device 121. The closure device 121 includes first and second fastening strips 130, 131 and a slider 132.

The fastening strips 130, 131 and the slider 132 have a longitudinal X axis 102, a transverse Y axis 104 and a vertical Z axis 106. The transverse Y axis 104 is perpendicular to the longitudinal X axis 102. The vertical Z axis 106 is perpendicular to the longitudinal X axis 102 and the vertical Z axis 106 is perpendicular to the transverse Y axis 104.

The fastening strips 130, 131 are adapted to be interlocked between a first end and a second end. The slider 132 is mounted onto the fastening strips 130, 131 so that the slider 132 is restrained from being removed from the fastening strips 130, 131 but free to slide along the X axis 102. The slider 132 engages the fastening strips 130, 131 so that when the slider 132 moves in an occlusion direction 114, the fastening strips 130, 131 interlock and the bag 120 is sealed, and when the slider 132 moves in a deocclusion direction 116, the

fastening strips 130, 131 separate and the bag 120 is open.

Side portions of a slider have front shoulders rear shoulders

Fig. 2 illustrates a partial top view of the closure device in Fig. 1 and depicts the fastening strips 130, 131 and slider 132. The slider includes first and second side portions 142, 144 attached to a top portion 140. The first side portion 142 includes first and second front shoulders 150, 152. The first side portion 142 additionally includes first and second rear shoulders 160, 162. Similarly, the second side portion 144 includes first and second front shoulders 154, 156 and first and second rear shoulders 164, 166.

Referring to Figs. 3-6, the first front shoulders 150, 154 are disposed perpendicular to the side portions 142, 144 and are placed across from each other. The second front shoulders 152, 156 are disposed parallel and in close proximity to the first front shoulders 150, 154 and are likewise placed across from each other. Similarly, the first rear shoulders 160, 164 are disposed perpendicular to the side portions 142, 144 and are placed across from each other. The second rear shoulders 162, 166 are disposed parallel and in close proximity to the first rear shoulders 160, 164 and are likewise placed across from each other.

The shoulders are such that some of the shoulders have a longer length than other shoulders. Additionally, the shoulders may be placed such that if one shoulder is of a long length, then the shoulder across from it is of a short length. In addition, if a shoulder is of a long length, then the shoulder next to that shoulder may be of a short length. Conversely, if the shoulder is of a short length, then the shoulders next to and across from

it may be of a long length. This situation causes portions of the fastening strips to bend around the shoulders, which further makes it difficult to remove the slider from the fastening strips. For example, as best
5 illustrated in Fig. 3, shoulder 150 is of a long length. The shoulder across from it, shoulder 154, and the shoulder disposed next to it, shoulder 152, are both of a short length.

10 Fig. 4 illustrates a front view of the slider 132. The top portion 140 of the slider includes a separator 133. The separator 133 may be generally triangular in shape. The separator 133 facilitates the deocclusion of the fastening strips. The first side portion 142
15 includes a first occlusion member 146. Similarly, the second side portion 144 includes a second occlusion member 148. The first and second occlusion members 146, 148 facilitate occlusion of the fastening strips by applying pressure to the fastening strips.

20 Figs. 7-9 sequentially illustrate the attachment of the slider 132 made in accordance with the present invention onto the fastening strips 130, 131 in the vertical Z axis 106. Although the following description
25 will be limited to the slider components illustrated in the respective view described, it will be appreciated that the other slider components will function in a similar manner. For example, the first front shoulders 150, 154 of the slider 132 will operate in the same
30 fashion as the second rear shoulders 162, 166 of the slider 132 during attachment of the slider 132 onto the fastening strips 130, 131.

Fig. 7 depicts occluded fastening strips 130, 131
35 and a slider 132 having first rear shoulders 160, 164 and

second rear shoulders 162, 166 in a relaxed position. The occluded fastening strips 130, 131 are immediately below the slider 132. Referring to Fig. 8, the slider 132 is moved in the vertical Z axis 106 towards the fastening strips 130, 131. The fastening strips engage the rear shoulders 160, 162, 164, 166 and deflect the side portions 142, 144 outwardly in the transverse Y axis 104. The fastening strips 130, 131 are guided into the slider 132 by the occlusion members 146, 148.

10

As shown in Fig. 9, upon further movement of the fastening strips 130, 131 toward the slider 132 in the vertical Z axis 106, the rear shoulders 160, 162, 164, 166, and the side portions 142, 144 retract back to their relaxed position. In addition, the separator 133 is forced between the flanges of the occluded fastening strips 130, 131.

15

During use of the slider 132 on the fastening strips 130, 131, the user may exert an upward force 180 in the Z axis 106 on the slider 132 as shown in Fig. 9. The upward force will cause the shoulders to engage the fastening strips. The following description will be limited to shoulders 160, 162, 164, 166. Thus, the shoulders 160, 162, 164, 166 would engage the ribs 182, 184. If the user continues to apply the upward force 180, the force would be transmitted through the shoulders 160, 162, 164, 166 to the first and second side portions 142, 144.

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The first and second side portions 142, 144 would begin to deflect outward in directions 180, 188. However, the shoulder 162 is longer than shoulder 166. Thus, the force required to move the shoulder 162 past the fastening strip 130 would be greater than the force

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required to move the shoulder 166 past the fastening strip 131 due to the additional distance to be traveled by the shoulder 162. Similarly, shoulders 160, 164 would operate in a similar manner. Therefore, more force is required to remove the slider 132 with one long shoulder opposite one short shoulder than one short shoulder opposite a second short shoulder. The other shoulders 150, 152, 154, 156 would operate in a similar manner.

Fig. 10 illustrates another embodiment of a slider 232. The slider 232 includes a top portion 240, a first side portion 242 and a second side portion 244. The side portions 242, 244 include first front shoulders 250, 254 and first rear shoulders 260, 264. The shoulders 250, 264 are of a long length and the shoulders 254, 260 are of a short length.

In keeping with a general aspect of the present invention and as will be described in greater detail below, the interlocking fastening strips of the present invention may be of various types or forms.

As shown in Fig. 11, the fastening strips may be U-channel fastening strips as described in U.S. Patent 4,829,641. U-channel fastening strips include a first fastening strip 330 with a first closure element 336 and a second fastening strip 331 with a second closure element 334. The first closure element 336 engages the second closure element 334. The first fastening strip 330 may include a flange 363 disposed at the upper end of the first fastening strip 330 and a rib 367 disposed at the lower end of the first fastening strip 330. The first fastening strip 330 may include a flange portion 369. Likewise, the second fastening strip 331 may include a flange 353 disposed at the upper end of the second

fastening strip 331 and a rib 357 disposed at the lower end of the second fastening strip 331. The second fastening strip 331 may include a flange portion 359. The side walls 322, 323 of the plastic bag 320 may be attached
5 to the fastening strips 330, 331 by conventional manufacturing techniques.

The second closure element 334 includes a base portion 338 having a pair of spaced-apart parallelly
10 disposed webs 340, 341, extending from the base portion 338. The base and the webs form a U-channel closure element. The webs 340, include hook closure portions 342, 344 extending from the webs 340, 341 respectively, and facing towards each other. The hook closure portions 342,
15 344 include guide surfaces 346, 347 which serve to guide the hook closure portions 342, 344 for occluding with the hook closure portions 352, 354 of the first closure element 336.

20 The first closure element 336 includes a base portion 348 including a pair of spaced-apart, parallelly disposed webs 350, 351 extending from the base portion 348. The base and the webs form a U-channel closure element. The webs 350, 351 include hook closure portions 352, 354
25 extending from the webs 350, 351 respectively and facing away from each other. The hook closure portions 352, 354 include guide surfaces 345, 355, which generally serve to guide the hook closure portions 352, 354 for occlusion with the hook closure portions 342, 344 of the second
30 closure element 334. The guide surfaces 345, 355 may also have a rounded crown surface.

When the slider is moved in the occlusion direction, the separator deoccludes the fastening strips 330, 331 as
35 shown in Fig. 11. Referring to Fig. 11, the closure

elements 334, 336 are deoccluded and specifically, the upper hook portions 342, 352 and the lower hook portions 344, 354 are deoccluded.

5 The interlocking fastening strips may comprise "arrowhead-type" or "rib and groove" fastening strips as shown in Fig. 12 and as described in U.S. Patent 3,806,998. The rib element 405 interlocks with the groove element 407. The rib element 405 is of generally arrow-
10 shape in transverse cross section including a head 410 comprising interlock shoulder hook portions 411 and 412 generally convergently related to provide a cam ridge 413 generally aligned with a stem flange 414 by which the head is connected in spaced relation with respect to the
15 supporting flange portion 408. (U.S. Patent 3,806,998, Col. 2, lines 16-23). At their surfaces nearest the connecting stem flange 414, the shoulder portions 411 and 412 define reentrant angles therewith providing interlock hooks engageable with interlock hook flanges 415 and 417
20 respectively of the groove element 407. (U.S. Patent 3,806,998, Col. 2, lines 23-28). Said hook flanges generally converge toward one another and are spread open to receive the head 410 therebetween when said head is pressed into said groove element 407 until the head is
25 fully received in a groove 418 of said groove element 407 generally complementary to the head and within which the head is interlocked by interengagement of the head shoulder hook portions 411 and 412 and the groove hook flanges 415 and 417. (U.S. Patent 3,806,998, Col. 2, lines
30 28-36). Through this arrangement, as indicated, the head and groove elements 405 and 407 are adapted to be interlockingly engaged by being pressed together and to be separated when forcibly pulled apart, as by means of a generally U-shaped slider 419. (U.S. Patent 3,806,998,
35 Col. 2, lines 36-41).

The slider 419 includes a flat back plate 420 adapted to run along free edges 421 on the upper ends of the sections of the flange portions ~~408 and 409 as shown in~~ the drawing. (U.S. Patent 3,806,998, Col. 2, lines 41-46). Integrally formed with the back plate 420 and extending in the same direction (downwardly as shown) therefrom are respective coextensive side walls 422 with an intermediate spreader finger 423 extending in the same direction as the side walls at one end of the slider. (U.S. Patent 3,806,998, Col. 2, lines 46-51). The side walls 422 are in the form of panels which are laterally divergent from a narrower end of the slider. (U.S. Patent 3,806,998, Col. 2, lines 51-55). The slider walls 422 are each provided with an inwardly projecting shoulder structure 424 flange adapted to engage respective shoulder ribs 425 and 427 on respectively outer sides of the lower section of the flange portions 408 and 409. (U.S. Patent 3,806,998, Col. 2, line 66 to Co. 3, line 3).

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Additionally, the interlocking fastening strips may comprise "profile" fastening strips, as shown in FIG. 13 and described in U.S. Patent 5,664,299. The first profile 516 has at least an uppermost closure element 516a and a bottommost closure element 516b. (U.S. Patent 5,664,299, Col. 3, lines 25-27). The closure elements 516a and 516b project laterally from the inner surface of strip 514. (U.S. Patent 5,664,299, Col. 3, lines 27-28). Likewise, the second profile 517 has at least an uppermost closure element 517a and a bottommost closure element 517b. (U.S. Patent 5,664,299, Col. 3, lines 28-30). The closure elements 517a and 517b project laterally from the inner surface of strip 515. (U.S. Patent 5,664,299, Col. 3, lines 30-32). When the bag is closed, the closure elements of profile 516 interlock with the corresponding

closure elements of profile 517. (U.S. Patent 5,664,299, Col. 3, lines 32-34). Closure elements 516a, 516b, 517a and 517b have hooks on the ends of the closure elements, so that the profiles remain interlocked when the bag is closed, thereby forming a seal. (U.S. Patent 5,664,299, Col. 3, lines 34-37).

The straddling slider 510 comprises an inverted U-shaped member having a top 520 for moving along the top edges of the strips 514 and 515. (U.S. Patent 5,664,299, Col. 4, lines 1-3). The slider 510 has side walls 521 and 522 depending from the top 520. (U.S. Patent 5,664,299, Col. 4, lines 3-4). A separating leg 523 depends from the top 520 between the side walls 521 and 522 and is located between the uppermost closure elements 516a and 517a of profiles 516 and 517. (U.S. Patent 5,664,299, Col. 4, lines 26-30). The fastening assembly includes ridges 525 on the outer surfaces of the fastening strips 514 and 515, and shoulders 521b and 522b on the side walls of the slider. (U.S. Patent 5,664,299, Col. 4, lines 62-65). The shoulders act as means for maintaining the slider in straddling relation with the fastening strips by grasping the lower surfaces of the ridges 525. (U.S. Patent 5,664,299, Col. 5, lines 4-7).

Also, the interlocking fastening strips may be "rolling action" fastening strips as shown in Fig. 14 and described in U.S. Patent 5,007,143. The strips 614 and 615 include profiled tracks 618 and 619 extending along the length thereof parallel to the rib and groove elements 616 and 617 and the rib and groove elements 616, 617 have complimentary cross-sectional shapes such that they are closed by pressing the bottom of the elements together first and then rolling the elements to a closed position toward the top thereof. (U.S. Patent 5,007,143, Col. 4,

line 62 to Col. 5, line 1). The rib element 616 is hook shaped and projects from the inner face of strip 614. (U.S. Patent 5,007,143, Col. 5, lines 1-3). The groove element 617 includes a lower hook-shaped projection 617a and a relatively straight projection 617b which extend from the inner face of strip 615. (U.S. Patent 5,007,143, Col. 5, lines 3-6). The profiled tracks 618 and 619 are inclined inwardly toward each other from their respective strips 614 and 615. (U.S. Patent 5,007,143, Col. 5, lines 6-8).

The straddling slider 610 comprises an inverted U-shaped plastic member having a back 620 for moving along the top edges of the tracks 618 and 619 with side walls 621 and 622 depending therefrom for cooperating with the tracks and extending from an opening end of the slider to a closing end. (U.S. Patent 5,007,143, Col. 5, lines 26-31). A separator finger 623 depends from the back 620 between the side walls 621 and 622 and is inserted between the inclined tracks 618 and 619. (U.S. Patent 5,007,143, Col. 5, lines 34-36). The slider 610 has shoulders 621a and 622a projecting inwardly from the depending side walls 621 and 622 which are shaped throughout the length thereof for cooperation with the depending separator finger 623 in creating the rolling action in opening and closing the reclosable interlocking rib and groove profile elements 616 and 617. (U.S. Patent 5,007,143, Col. 5, lines 43-49).

Although several interlocking fastening strip embodiments have been specifically described and illustrated herein, it will be readily appreciated by those skilled in the art that other kinds, types, or forms of fastening strips may alternatively be used

without departing from the scope or spirit of the present invention.

The interlocking fastening strips may be manufactured
5 by extrusion through a die. The interlocking fastening
strips may be formed from any suitable thermoplastic
material including, for example, polyethylene,
polypropylene, nylon, or the like, or from a combination
thereof. Thus, resins or mixtures of resins such as high
10 density polyethylene, medium density polyethylene, and low
density polyethylene may be employed to prepare the
interlocking fastening strips. For example, the fastening
strips may be made from low density polyethylene.

15 When the fastening strips are used in a sealable bag,
the fastening strips and the films that form the body of
the bag may be conveniently manufactured from heat
sealable material. In this way, the bag may be
economically formed by using an aforementioned
20 thermoplastic material and by heat sealing the fastening
strips to the bag. For example, the bag may be made from
a mixture of high pressure, low density polyethylene and
linear, low density polyethylene.

25 The fastening strips may be manufactured by extrusion
or other known methods. For example, the closure device
may be manufactured as individual fastening strips for
later attachment to the bag or may be manufactured
integrally with the bag. In addition, the fastening
30 strips may be manufactured with or without flange portions
on one or both of the fastening strips depending upon the
intended use of the fastening strips or expected
additional manufacturing operations.

The fastening strips can be manufactured in a variety of forms to suit the intended use. The fastening strips may be integrally formed on the opposing sidewalls of the container or bag, or connected to the container by the use of any of many known methods. For example, a thermoelectric device may be applied to a film in contact with the flange portion of the fastening strips or the thermoelectric device may be applied to a film in contact with the base portion of fastening strips having no flange portion, to cause a transfer of heat through the film to produce melting at the interface of the film and a flange portion or base portion of the fastening strips. Suitable thermoelectric devices include heated rotary discs, traveling heater bands, resistance-heated slide wires, and the like. The connection between the film and the fastening strips may also be established by the use of hot melt adhesives, hot jets of air to the interface, ultrasonic heating, or other known methods. The bonding of the fastening strips to the film stock may be carried out either before or after the film is U-folded to form the bag. In any event, such bonding is done prior to side sealing the bag at the edges by conventional thermal cutting. In addition, the first and second fastening strips may be positioned on opposite sides of the film. Such an embodiment would be suited for wrapping an object or a collection of objects such as wires. The first and second fastening strips should usually be positioned on the film in a generally parallel relationship with respect to each other, although this will depend on the intended use.

The slider may be multiple parts and snapped together. In addition, the slider may be made from multiple parts and fused or welded together. The slider may also be a one piece construction. The slider can be

colored, opaque, translucent or transparent. The slider may be injection molded or made by any other method. The slider may be molded from any suitable plastic material, such as, nylon, polypropylene, polystyrene, acetal, 5 toughened acetal, polyketone, polybutylene terephthalate, high density polyethylene, polycarbonate or ABS (acrylonitrile-butadiene-styrene).

From the foregoing it will be understood that 10 modifications and variations may be effectuated to the disclosed structures - particularly in light of the foregoing teachings - without departing from the scope or spirit of the present invention. As such, no limitation with respect to the specific embodiments described and 15 illustrated herein is intended or should be inferred. In addition, all references and copending applications cited herein are hereby incorporated by reference in their entireties.

WHAT IS CLAIMED IS:

1. A closure device, comprising:
 - 5 first and second interlocking fastening strips arranged to be interlocked over a predetermined length;
 - a slider slidably disposed on the fastening strips, the slider facilitating occlusion of the fastening strips when moved in one direction, the slider facilitating the
 - 10 deocclusion of the fastening strips when the slider is moved in the opposite direction, the slider includes a top portion, the slider includes a first side portion, the slider includes a second side portion;
 - the first side portion includes a first shoulder, the
 - 15 second side portion includes a second shoulder, the second shoulder opposing the first shoulder, wherein the first shoulder has a longer length than the second shoulder.
2. The invention as in claim 1 wherein the slider
 - 20 includes a third shoulder and a fourth shoulder, the third shoulder opposing the fourth shoulder, the third shoulder has a length longer than the fourth shoulder.
3. The invention as in claim 2 wherein the slider
 - 25 includes a fifth shoulder and a sixth shoulder, the fifth shoulder opposing the sixth shoulder, wherein the fifth shoulder has a length longer than the sixth shoulder.
4. The invention as in claim 3 wherein the slider
 - 30 includes a seventh shoulder and an eighth shoulder, the seventh shoulder opposing the eighth shoulder, wherein the seventh shoulder has a length longer than the eighth shoulder.

5. The invention as in claim 2 wherein the first shoulder is in close proximity to the fourth shoulder and the second shoulder is in close proximity to the third shoulder.

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6. The invention as in claim 2 wherein the slider has a front portion and a rear portion, the first shoulder and the second shoulder are located in the front portion, the third shoulder and the fourth shoulder are located in the rear portion.

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7. The invention as in claim 2 wherein the slider has a front portion and a rear portion, the first shoulder and the second shoulder are located in the front portion, the third shoulder and the fourth shoulder are located in the front portion.

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8. The invention as in claim 2 wherein the first shoulder has a length substantially equal to the length of the third shoulder.

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9. The invention as in claim 2 wherein the first shoulder is substantially parallel to the fourth shoulder.

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10. The invention as in claim 2 wherein the first side portion includes the fourth shoulder and the second side portion includes the third shoulder.

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11. The invention as in claim 1 wherein the fastening strips comprise U-channel type fastening strips.

12. The invention as in claim 1 wherein the fastening strips comprise arrowhead type fastening strips.

5 13. The invention as in claim 1 wherein the fastening strips comprise profile type fastening strips.

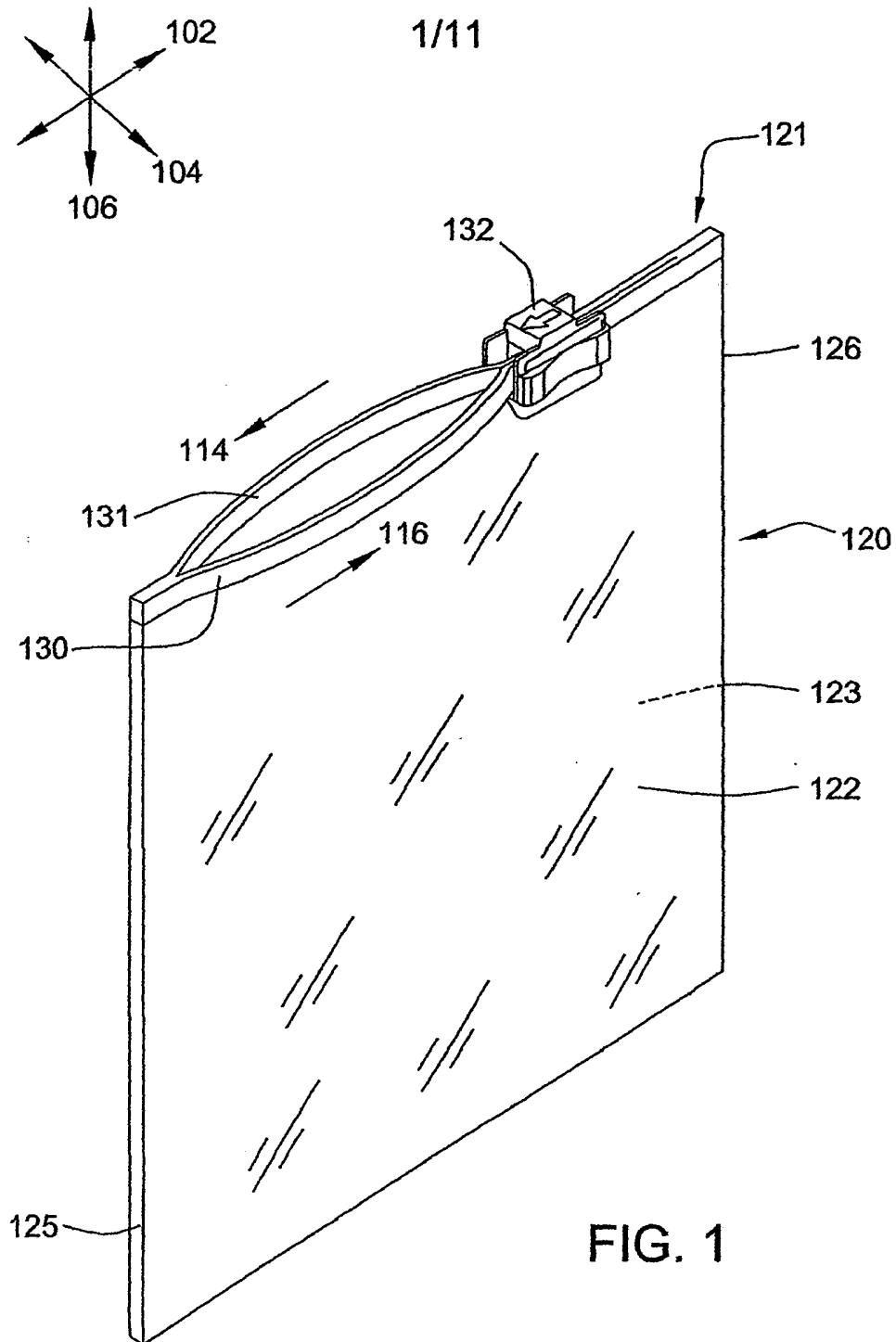
14. The invention as in claim 1 wherein the fastening strips comprise rolling action type fastening
10 strips.

15. A container comprising:
first and second sidewalls joined to form a compartment with an opening;
15 first and second interlocking fastening strips respectively connected to the first and second sidewalls at the opening, the fastening strips being arranged to be interlocked over a predetermined length;
a slider slidably disposed on the fastening strips,
20 the slider facilitating occlusion of the fastening strips when moved in one direction, the slider facilitating the deocclusion of the fastening strips when the slider is moved in the opposite direction, the slider includes a top portion, the slider includes a first side portion, the
25 slider includes a second side portion;
the first side portion includes a first shoulder, the second side portion includes a second shoulder, the second shoulder opposing the first shoulder, wherein the first shoulder has a longer length than the second shoulder.

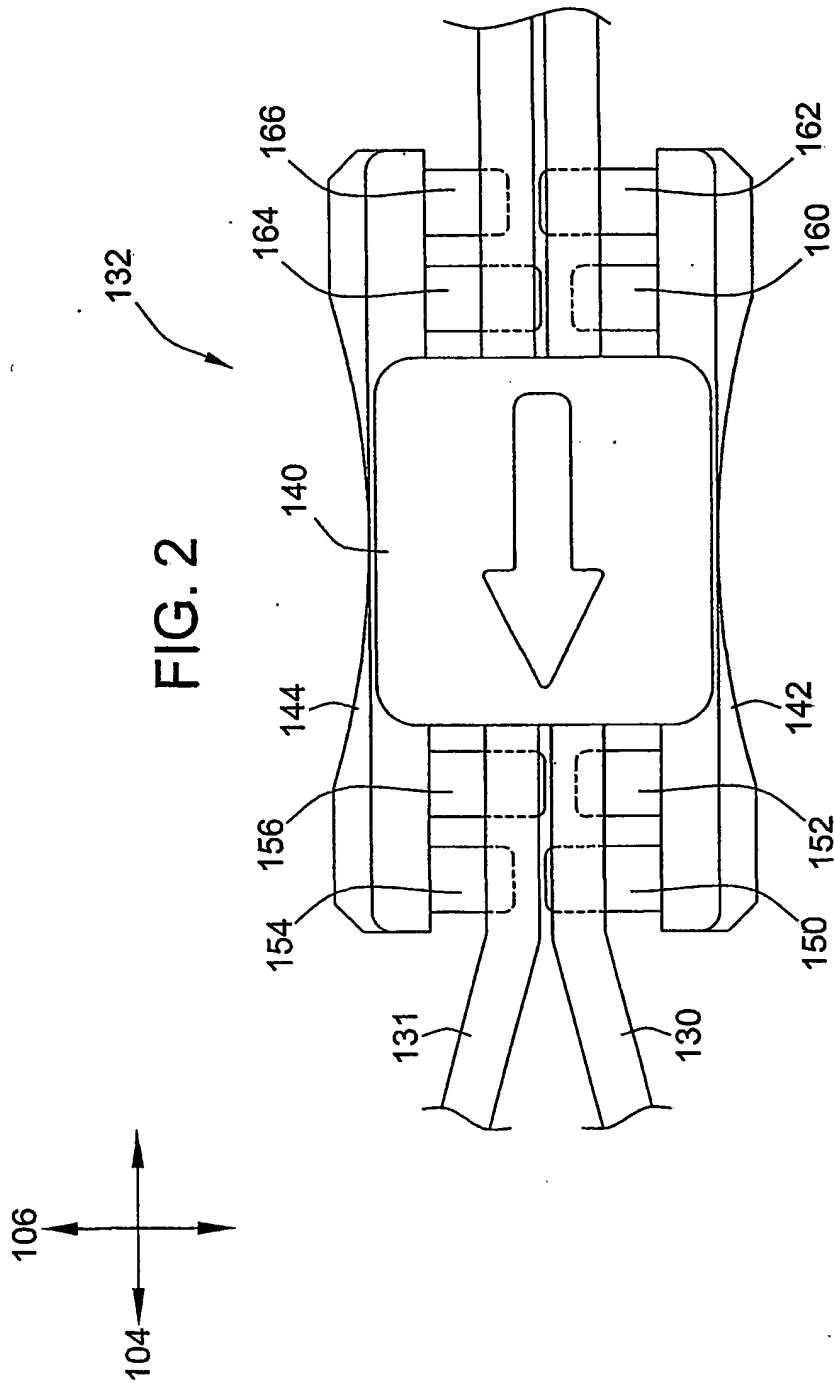
30 16. A method of manufacturing a closure device, comprising:
providing first and second interlocking fastening strips arranged to be interlocked over a predetermined
35 length;

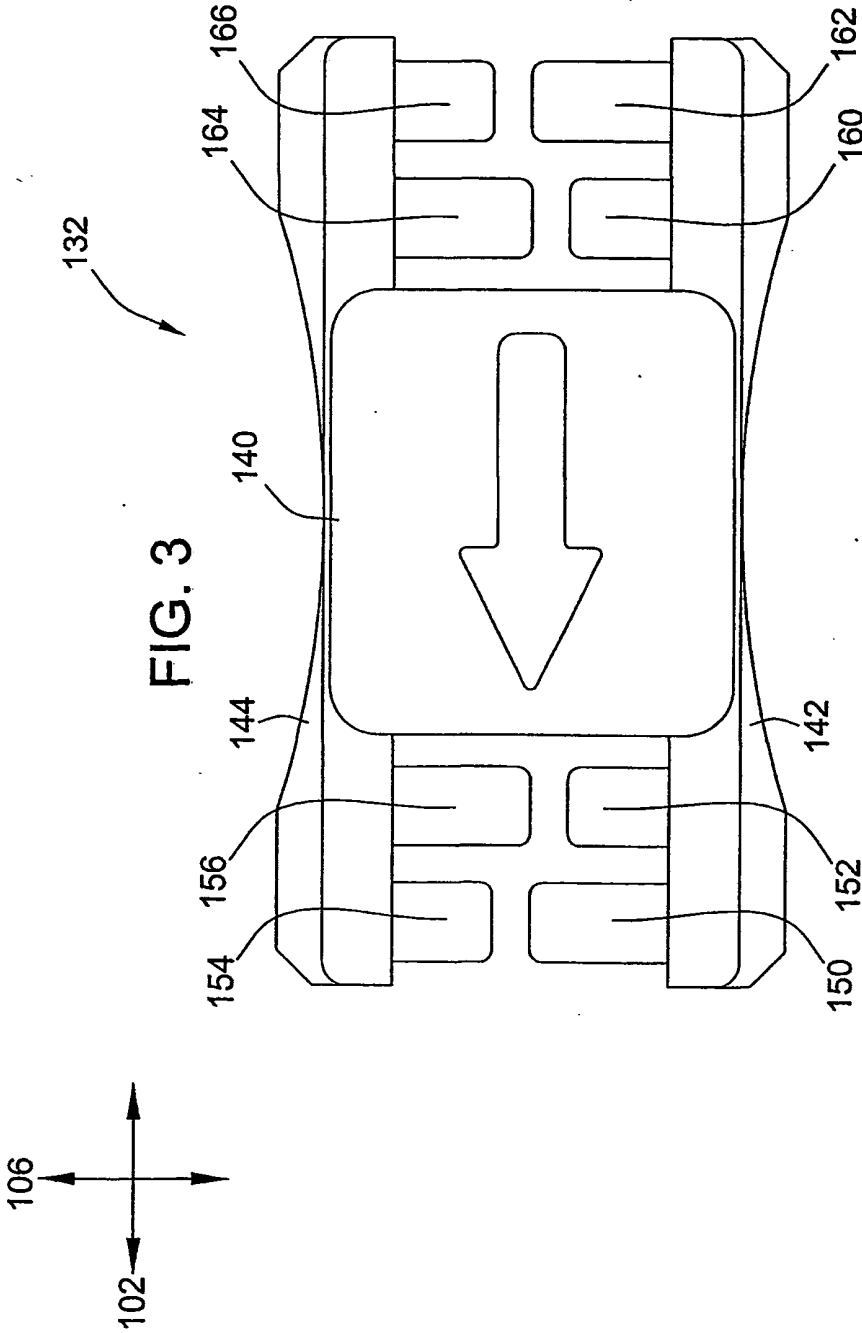
providing a slider slidably disposed on the fastening strips, the slider facilitating occlusion of the fastening strips when moved in one direction, the slider facilitating the deocclusion of the fastening strips when the slider is moved in the opposite direction, the slider includes a top portion, the slider includes a first side portion, the slider includes a second side portion;

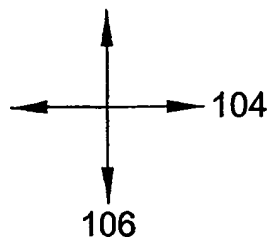
the first side portion includes a first shoulder, the second side portion includes a second shoulder, the second shoulder opposing the first front shoulder, wherein the first shoulder has a longer length than the second shoulder.



2/11

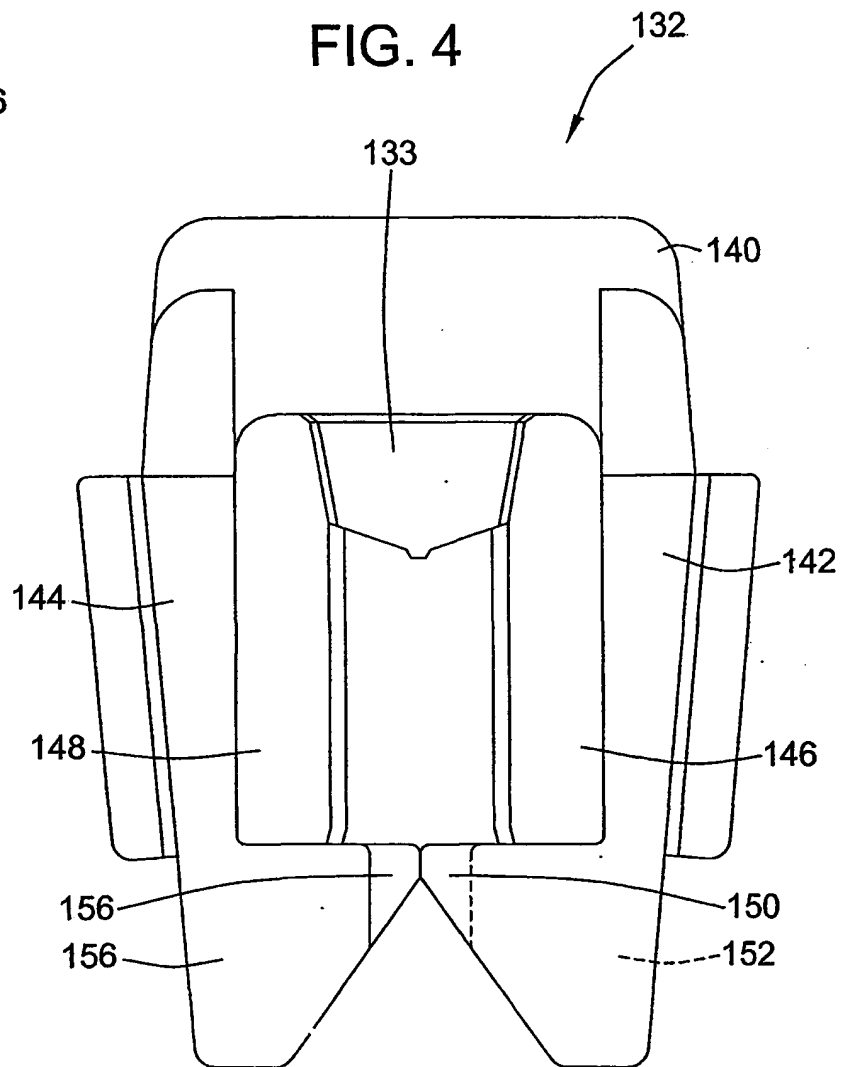


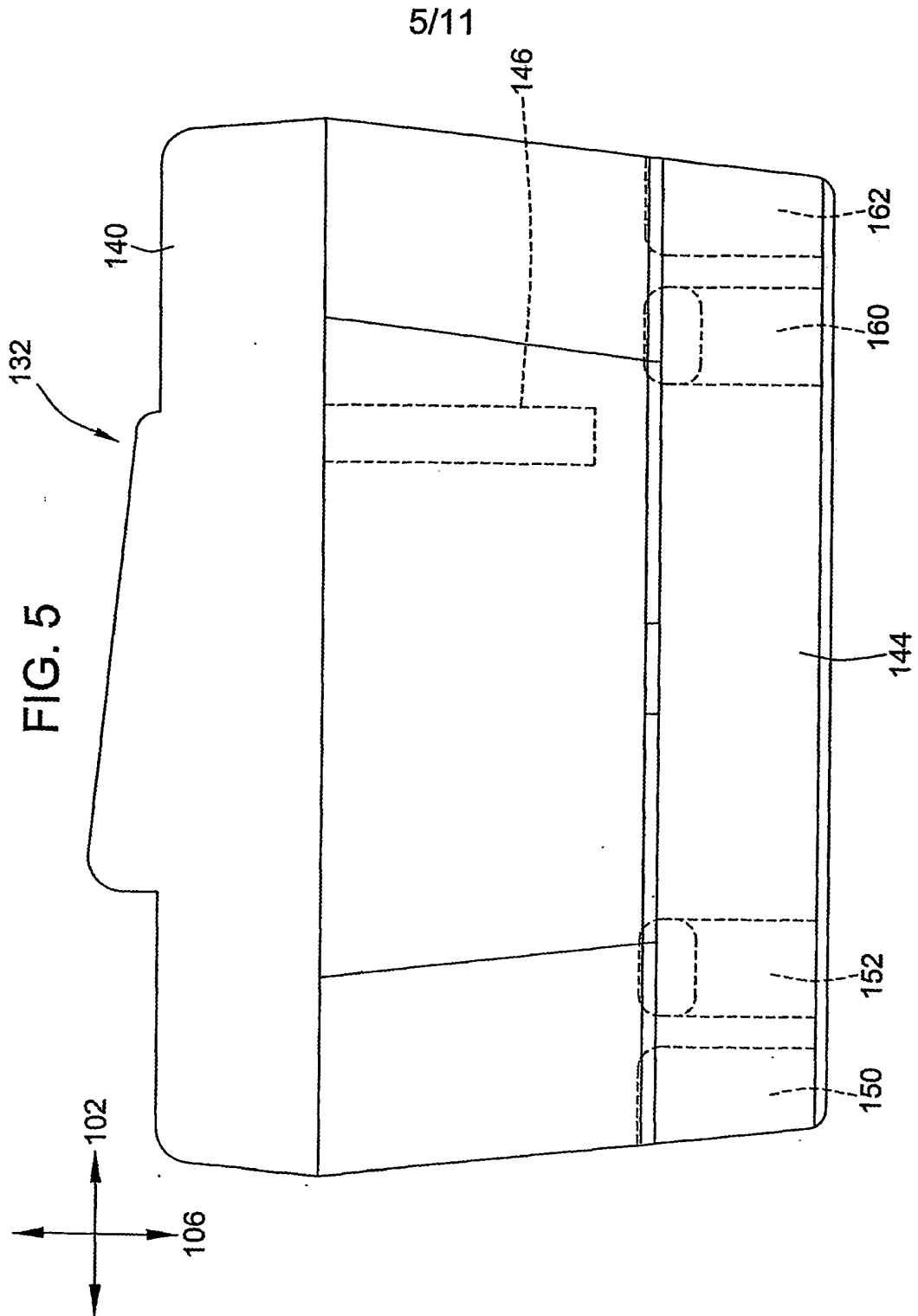




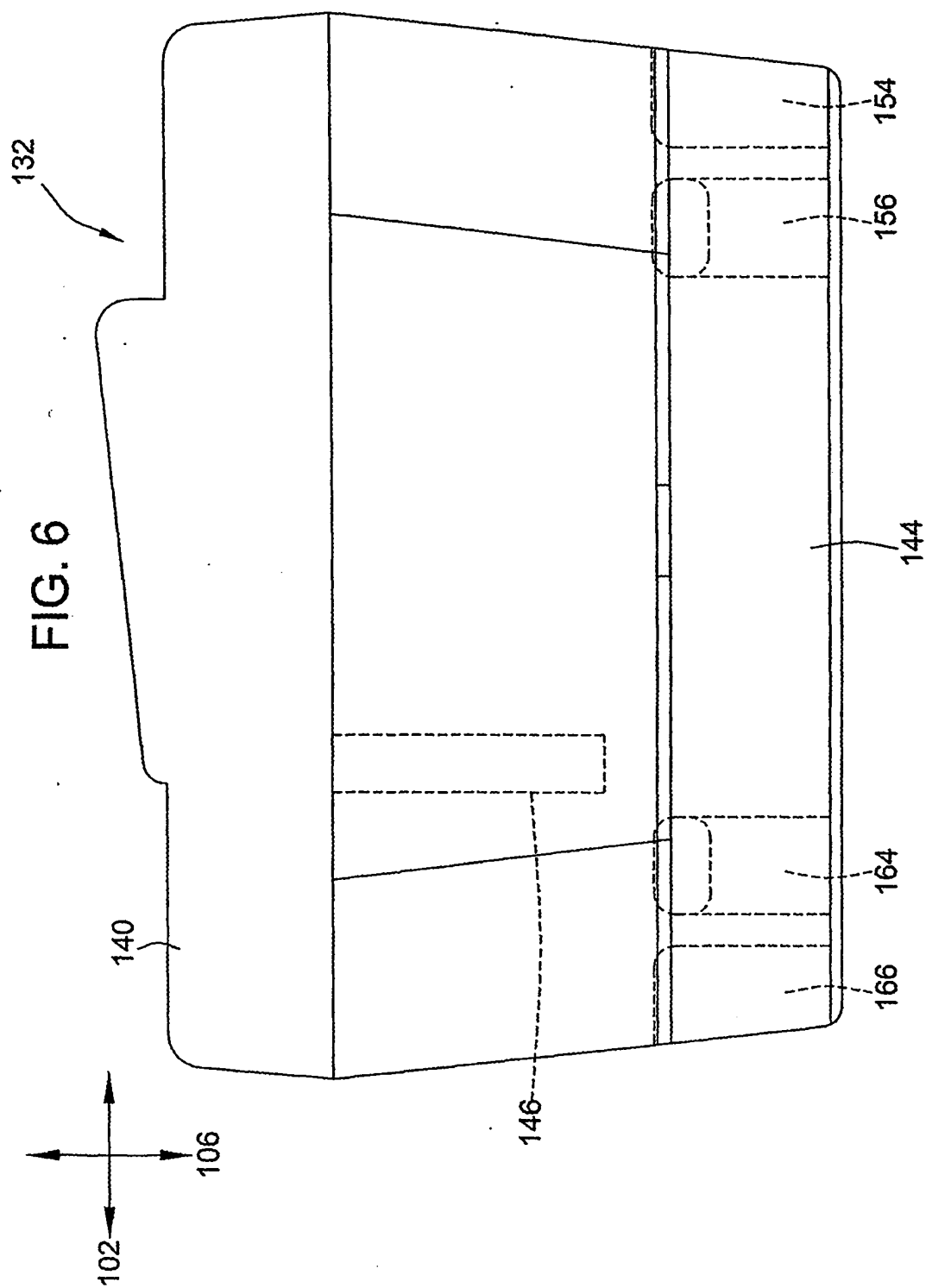
4/11

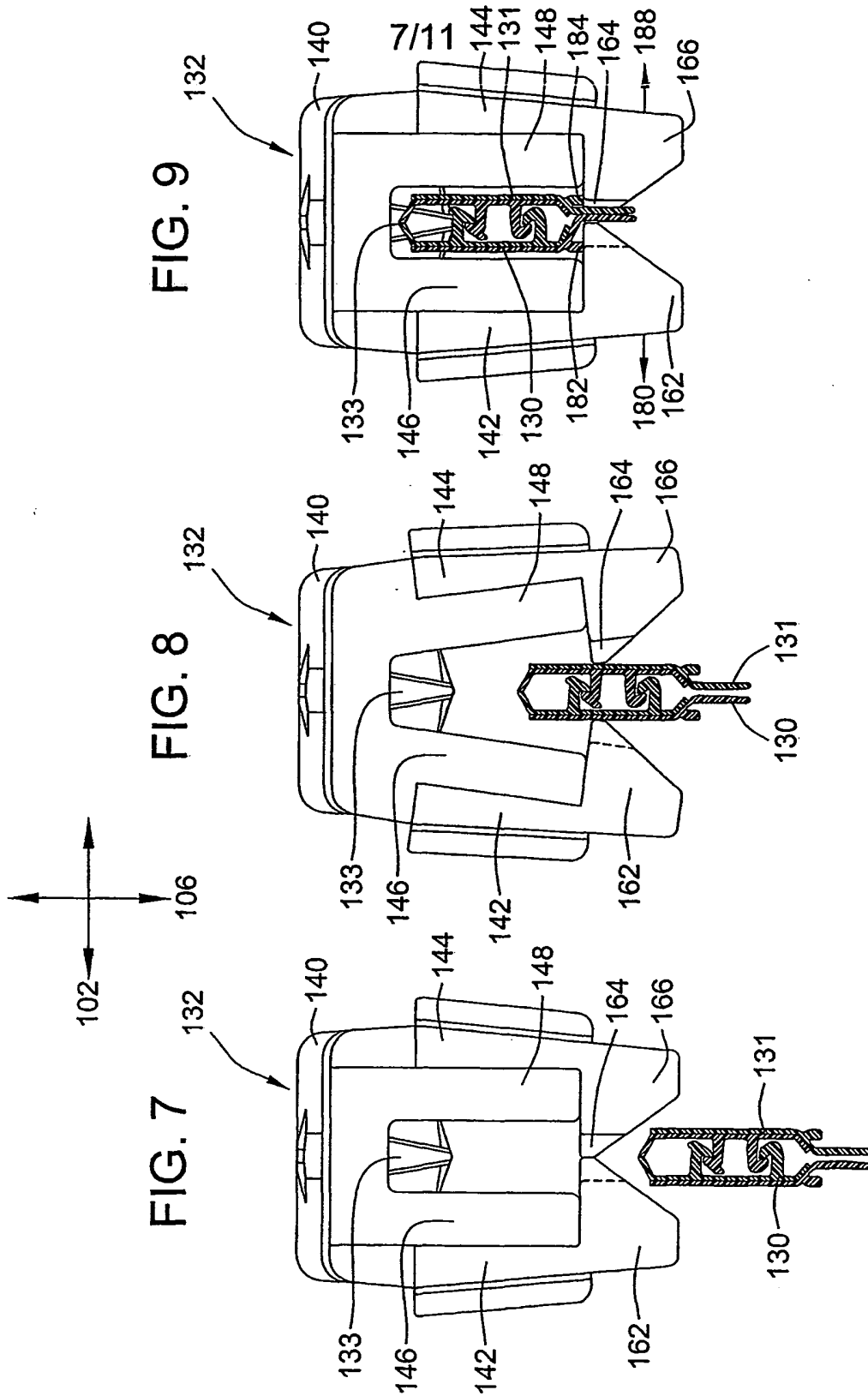
FIG. 4



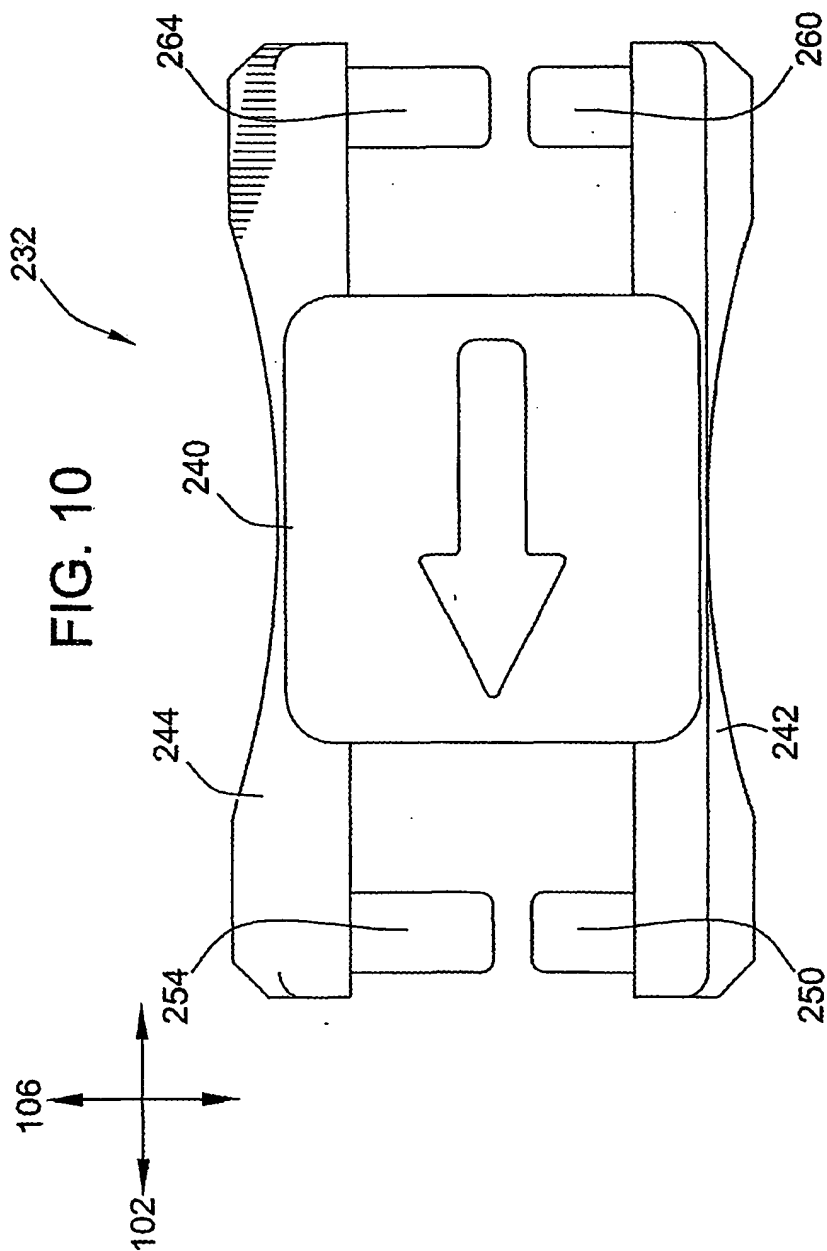


6/11





8/11



9/11

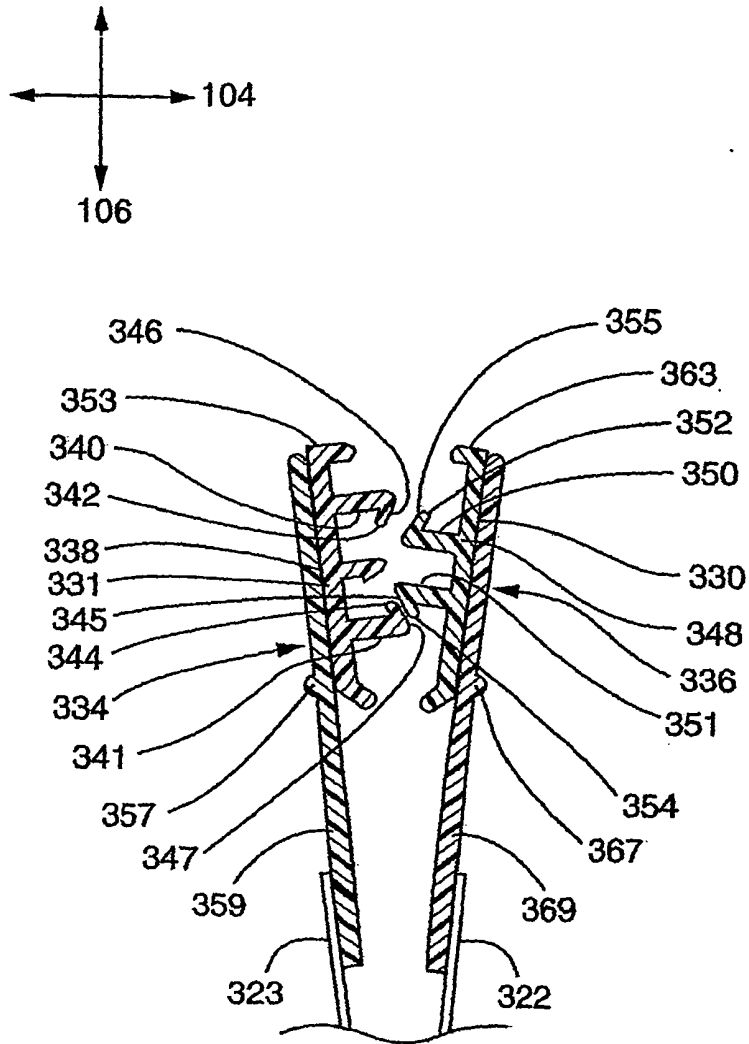
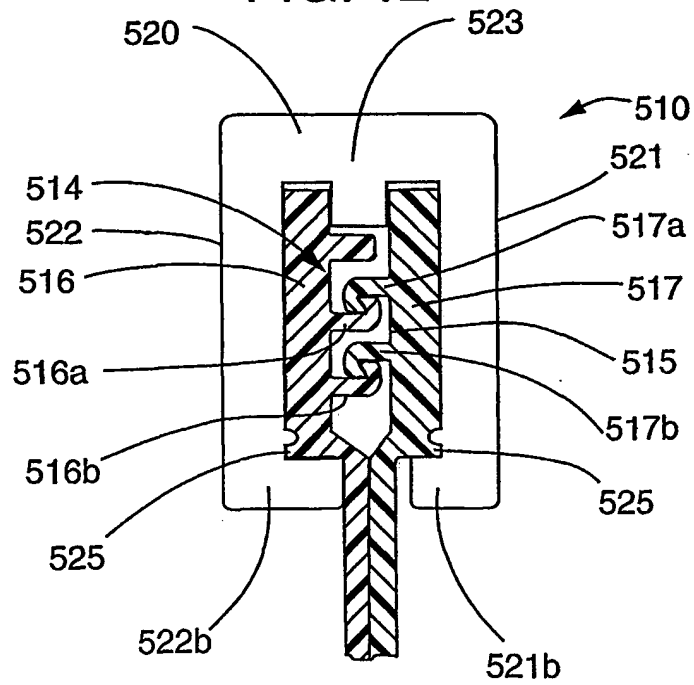
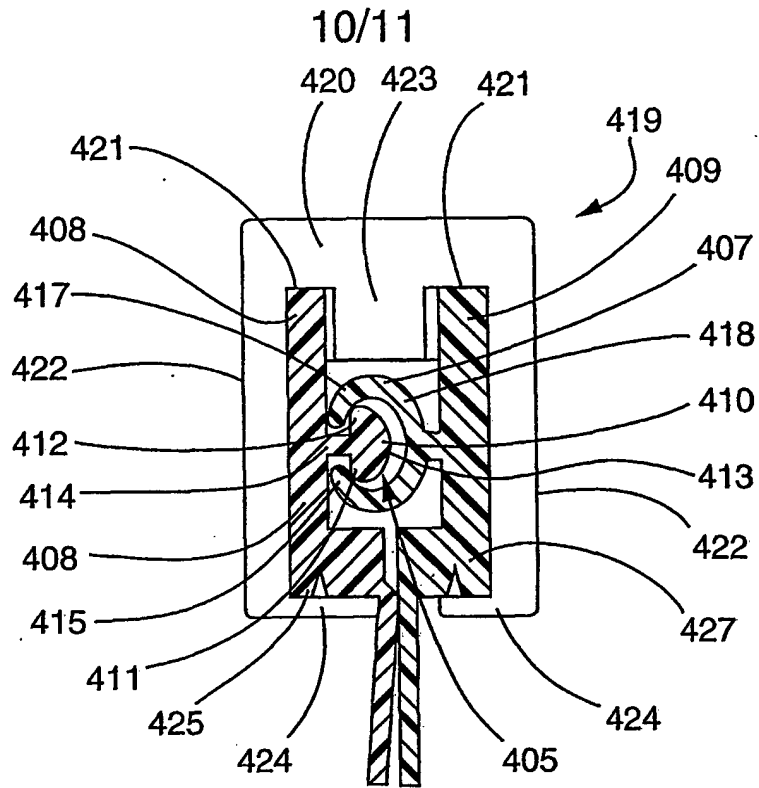


FIG. 11



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/08074

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A44B 19/26

US CL : 24/415

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 24/30.5,399,400,415,427,428;383/64,69

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	US 3,122,807 (B. M. Ausnit) 03 March 1964 (03.03.1964), column 3, lines 46-50 and Figures 1-4	1,13-16 11,12 2-10
X Y A	US 5,067,208 A1 (Herrington, Jr et al.) 26 November 1991 (26.11.1991), column 6, lines 8-28 and Figures 2 and 6	1,2,6,8,9,13-16 12 3-5,7,10-11
X Y A	US 5,442,838 (Richardson et al.) 22 August 1995 (22.08.1995), column 3, lines 6-30 and Figures 1-5	1,13-16 11,12 2-10
X Y A	US 6,014,795 A1 (McMahon et al.) 18 January 2000 (18.01.2000), column 3, lines 50-65 and Figures 1-3	1,11,15,16 12,13,14 2-10,
A	EP 0 479 661 A1 (Hugues) 30 September 1991 (30.09.1991), Figures 2, 4 and 10	1-16
Y	US 6,047,450 (Machacek et al.) 11 April 2000 (11.04.2000), column 5, lines 20-35 and 55-64 and Figures 2, 3, 5C, 7B and 12-13	12-14
A		1-11,15,16

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

24 May 2001 (24.05.2001)

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